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(54) UNIVERSAL TIME WATCH

(71) We, TIMEX CORPORATION, a Corporation organized under the laws of the State of Delaware, United States of America of Waterbury, Connecticut 06720, United States of America, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to regular and auxiliary hour hand driving and setting mechanism for a horological device.

So-called "Time zone" watches are well known in the art and include the usual or regular hour hand for indicating local time and one or more auxiliary hour hands or dials for indicating the time in another time zone or zones. Various mechanisms have been proposed for setting the auxiliary hands or dials. Such mechanisms have either been complicated, or two separate crowns have been necessary, or frictional drives have been used between the regular and auxiliary hour hand hubs which are subject to slippage.

Accordingly, one objective of the present invention is to provide a time zone setting mechanism utilizing the same crown and stem assembly to change the time zone, as well as to set the regular time on the horological device.

A further objective of the present invention is to provide a time zone setting mechanism with a positive drive between the regular and auxiliary hour hands, in which the auxiliary hand may be set to a new time zone by the regular time setting stem and crown assembly.

Another objective of the present invention is to provide an improved time zone setting mechanism which is simple to construct and requires a minimum of parts.

According to the invention there is provided regular and auxiliary hour hand driving and setting mechanism for a horological device having a dial, comprising a first rotatably mounted spindle carrying a

regular hour hand, a second spindle rotatably and coaxially mounted on said first spindle and carrying an auxiliary hour hand, an hour wheel fixed to said first spindle to drive it, a coupling member fixed to said second spindle and coaxially mounted adjacent said hour wheel, a fixed spring stop member disposed adjacent said coupling member, said hour wheel and said coupling member being resiliently engaged in a frictional coupling tending to prevent rotation of said coupling member with respect to said hour wheel whereby said coupling member drives said second spindle from the hour wheel, and said spring stop member and said coupling member being co-operatively associated in a one-way ratchet connection preventing rotation of said coupling member with respect to the spring stop member counter-clockwise as referred to the face of the dial.

Suitably the coupling member comprises a resilient disc engaging the hour wheel in a friction coupling, and the spring stop member has flexible radial spring arms engaging raised tabs on the coupling member to form the one-way ratchet connection with the coupling member.

The above and other features and advantages of the invention will further be understood from the following description of a preferred embodiment of the invention, reference being made to the accompanying drawings, in which:—

Figure 1 is a horizontal cross-section through the hour hand drive and setting mechanism;

Figure 2 is a view of the time zone watch;

Figure 3 is a perspective view of the spring stop member;

Figure 4 is a partial plan view of the coupling member;

Figure 5 is an enlarged horizontal cross-sectional view along line V—V of Figure 4; Figure 6 is a partial plan view of the hour wheel, and

Figure 7 is an assembled plan view of the auxiliary and regular setting mechanism.

Referring now to Figure 1 of the drawings, only the parts necessary to an understanding of the present invention are shown, the remainder of elements being conventional. A hand drive and setting mechanism, shown generally as 1, is carried on a bridge member 2. Power to drive the hands enters through a sweep second staff 3 carrying a sweep second hand 4. Staff 3 is journaled at one end in a bearing 5 and inside a fixed spindle 6 attached to bridge 2. Power is transmitted from staff 3 through a gear train (not shown) to a crown gear 7 which includes time setting and time zone setting crown teeth 8. The crown teeth 8 are engageable through conventional mechanism (not shown) by means of an external crown and stem assembly 9 when the stem is retracted and rotated in either direction. Crown gear 7 is connected to a minute pinion 10 and also journaled in bridge 2.

Crown gear 7 also drives, via a wheel 30, a cannon pinion 11 journaled on fixed spindle 6 and carrying a minute hand 12.

The minute pinion 10 drives an hour wheel 13 attached to hollow spindle 14 which is rotatably journaled on cannon pinion 11 and carries a regular hour hand 15. The foregoing described portions of the watch are conventional.

A second hollow spindle 16 is rotatably mounted coaxially with spindle 14 and fixedly carries an auxiliary hour hand 17 on one end and a special coupling member 18 on its other end. Coupling member 18 is on one side resiliently engageable through a frictional coupling connection with hour wheel 13, and on its other side through a one-way ratchet connection with a spring stop member 19. Member 19 is carried beneath and is fixed to the dial face 20 of the watch.

Referring to Figure 2 of the drawings, a typical watch is seen, indicating the arrangement of second hand 4, minute hand 12 and hour hand 15, which are conventional, and the auxiliary hour hand 17 set to show the time in a zone three hours ahead of local time.

Figure 3 is a perspective view of the spring stop member 19 and illustrates its construction. A ring 21 has upstanding tabs 22 on its inner periphery which lock the member 19 to the dial face by means of notches 28 (see Figure 1). Extending from the outer periphery are radial spring arms 23 which are relatively flexible and which are engageable beneath raised tabs 24 on the ratchet coupling member 18.

Figures 4 and 5 are views of the coupling member 18 showing it to comprise a resilient disc having the raised tabs 24 uniformly spaced around its outer periphery. The disc is slightly dished and curves from its centre to its outer periphery 25. Figure 6 is a plan

view of the hour wheel 13 having a flat surface and teeth 26 engageable with the minute pinion. When the hour wheel is assembled together with the coupling member 18, as shown in Figure 1, the periphery 25 of coupling member 18 engages the surface of hour wheel 13 at 27 and is spring-loaded against it. The peripheral engagement tends to prevent any slippage during normal running or setting of the time.

In Figure 7, the assembly of hour wheel 13, ratchet coupling member 18, and spring stop member 19 are shown with the dial face removed. The mechanism is shown during setting of the auxiliary hour hand. In this position, radial spring arms 23 are engaged beneath tabs 24 on the ratchet coupling member 18, thereby preventing rotation of member 18 in a counter-clockwise direction, since spring stop member 19 is fixed to the dial 20 through tabs 22. However, hour wheel 13 can move in a counter-clockwise direction by slippage of the frictional coupling between the periphery 25 of coupling member 18 and hour wheel 13 (see Figure 1).

In order to set the auxiliary hour hand relative to the regular hour hand, crown assembly 9 is retracted and rotated so as to turn hour wheel 13 counter-clockwise. Radial spring arms 23 engage beneath raised tabs 24 on the coupling member 18 as it attempts to rotate with the hour wheel 13 and hold the coupling member in place. Slippage of the friction coupling at point 27 takes place due to resilience of member 18 so that spindles 14 and 16 can rotate relative to one another. Therefore the regular hour hand can be moved relative to the fixed auxiliary hand to indicate the time difference of a particular time zone. This can be set at hour intervals or any fraction thereof by eye.

For normal setting of the hands, the crown assembly 9 is rotated in the opposite or normal driving direction to rotate hour wheel 13 clockwise. The spring loading of coupling 18 against the hour wheel 13 causes both regular and auxiliary hands to move together, while the fixed flexible radial arms 23 disengage from and pass over tabs 24. When the minute pinion 10 is driving the hour wheel during normal running of the watch mechanism, the hands are driven together, again through the frictional coupling at the periphery which is much less subject to slippage than prior art frictional couplings at the hubs. Since the radial arms 23 are very flexible, they do not interfere materially with the drive and consume little additional power because of the very weak ratcheting action.

WHAT WE CLAIM IS:—

1. Regular and auxiliary hour hand driving

Referring now to Figure 1 of the drawings, only the parts necessary to an understanding of the present invention are shown, the remainder of elements being conventional.

5 A hand drive and setting mechanism, shown generally as 1, is carried on a bridge member 2. Power to drive the hands enters through a sweep second staff 3 carrying a sweep second hand 4. Staff 3 is journaled at one end in a bearing 5 and inside a fixed spindle 10 6 attached to bridge 2. Power is transmitted from staff 3 through a gear train (not shown) to a crown gear 7 which includes time setting and time zone setting crown teeth 8. The crown teeth 8 are engageable through 15 conventional mechanism (not shown) by means of an external crown and stem assembly 9 when the stem is retracted and rotated in either direction. Crown gear 7 is connected to a minute pinion 10 and also 20 journaled in bridge 2.

Crown gear 7 also drives, via a wheel 30, a cannon pinion 11 journaled on fixed spindle 6 and carrying a minute hand 12.

25 The minute pinion 10 drives an hour wheel 13 attached to hollow spindle 14 which is rotatably journaled on cannon pinion 11 and carries a regular hour hand 15. The foregoing described portions of the watch are conventional.

30 A second hollow spindle 16 is rotatably mounted coaxially with spindle 14 and fixedly carries an auxiliary hour hand 17 on one end and a special coupling member 18 on its other end. Coupling member 18 is on 35 one side resiliently engageable through a frictional coupling connection with hour wheel 13, and on its other side through a one-way ratchet connection with a spring stop member 19. Member 19 is carried 40 beneath and is fixed to the dial face 20 of the watch.

Referring to Figure 2 of the drawings, a typical watch is seen, indicating the 45 arrangement of second hand 4, minute hand 12 and hour hand 15, which are conventional, and the auxiliary hour hand 17 set to show the time in a zone three hours ahead of local time.

50 Figure 3 is a perspective view of the spring stop member 19 and illustrates its construction. A ring 21 has upstanding tabs 22 on its inner periphery which lock the member 19 to the dial face by means of 55 notches 28 (see Figure 1). Extending from the outer periphery are radial spring arms 23 which are relatively flexible and which are engageable beneath raised tabs 24 on the ratchet coupling member 18.

60 Figures 4 and 5 are views of the coupling member 18 showing it to comprise a resilient disc having the raised tabs 24 uniformly spaced around its outer periphery. The disc is slightly dished and curves from its centre 65 to its outer periphery 25. Figure 6 is a plan

view of the hour wheel 13 having a flat surface and teeth 26 engageable with the minute pinion. When the hour wheel is assembled together with the coupling member 18, as shown in Figure 1, the 70 periphery 25 of coupling member 18 engages the surface of hour wheel 13 at 27 and is spring-loaded against it. The peripheral engagement tends to prevent any slippage during normal running or setting of 75 the time.

In Figure 7, the assembly of hour wheel 13, ratchet coupling member 18, and spring stop member 19 are shown with the dial face removed. The mechanism is shown during 80 setting of the auxiliary hour hand. In this position, radial spring arms 23 are engaged beneath tabs 24 on the ratchet coupling member 18, thereby preventing rotation of member 18 in a counter-clockwise direction, 85 since spring stop member 19 is fixed to the dial 20 through tabs 22. However, hour wheel 13 can move in a counter-clockwise direction by slippage of the frictional coupling between the periphery 25 of 90 coupling member 18 and hour wheel 13 (see Figure 1).

In order to set the auxiliary hour hand relative to the regular hour hand, crown assembly 9 is retracted and rotated so as to 95 turn hour wheel 13 counter-clockwise. Radial spring arms 23 engage beneath raised tabs 24 on the coupling member 18 as it attempts to rotate with the hour wheel 13 and hold the coupling member in place. 100 Slippage of the friction coupling at point 27 takes place due to resilience of member 18 so that spindles 14 and 16 can rotate relative to one another. Therefore the regular hour hand can be moved relative to the fixed 105 auxiliary hand to indicate the time difference of a particular time zone. This can be set at hour intervals or any fraction thereof by eye.

For normal setting of the hands, the 110 crown assembly 9 is rotated in the opposite or normal driving direction to rotate hour wheel 13 clockwise. The spring loading of coupling 18 against the hour wheel 13 causes both regular and auxiliary hands to move 115 together, while the fixed flexible radial arms 23 disengage from and pass over tabs 24. When the minute pinion 10 is driving the hour wheel during normal running of the watch mechanism, the hands are driven 120 together, again through the frictional coupling at the periphery which is much less subject to slippage than prior art frictional couplings at the hubs. Since the radial arms 23 are very flexible, they do not interfere 125 materially with the drive and consume little additional power because of the very weak ratcheting action.

WHAT WE CLAIM IS:—

1. Regular and auxiliary hour hand driving 130



and setting mechanism for a horological device having a dial, comprising a first rotatably mounted spindle carrying a regular hour hand, a second spindle 5 rotatably and coaxially mounted on said first spindle and carrying an auxiliary hour hand, an hour wheel fixed to said first spindle to drive it, a coupling member fixed to said second spindle and coaxially mounted 10 adjacent said hour wheel, a fixed spring stop member disposed adjacent said coupling member, said hour wheel and said coupling member being resiliently engaged in a frictional coupling tending to prevent 15 rotation of said coupling member with respect to said hour wheel, whereby said coupling member drives said second spindle from the hour wheel, and said spring stop member and said coupling member being 20 co-operatively associated in a one-way ratchet connection preventing rotation of said coupling member with respect to the spring stop member counter-clockwise as referred to the face of the dial.

2. Driving and setting mechanism according to Claim 1, wherein said coupling member comprises a resilient disc having 25 uniformly spaced raised tabs on its outer periphery, said disc engaging said hour wheel near said outer periphery.

3. Driving and setting mechanism according to Claim 1 or Claim 2, wherein 30 said fixed spring stop member comprises a ring having flexible spring arms uniformly spaced and extending radially therefrom.

4. Driving and setting mechanism according to Claim 1, wherein said one-way 35 ratchet connection comprises a plurality of flexible radial arms on the spring stop member arranged to engage a plurality of

raised tabs on the periphery of said coupling member.

5. Regular and auxiliary hour hand driving and setting mechanism for a horological 45 device having a dial, comprising a first rotatably mounted spindle carrying a regular hour hand, a second spindle rotatably and coaxially mounted on said first spindle and carrying an auxiliary hour hand, 50 an hour wheel fixed to said first spindle to drive it and having a flat surface thereon, a coupling member fixed to said second spindle to drive it from the hour wheel, said coupling member comprising a resilient disc 55 coaxially mounted adjacent said hour wheel and having a plurality of raised tabs uniformly spaced about its periphery, said disc curving to resiliently engage said hour wheel flat surface at said periphery forming 60 a frictional driving coupling therebetween, and a fixed spring stop member disposed adjacent said coupling member and connected to said dial, said spring stop member having a plurality of flexible arms extending 65 radially and forming a one-way ratchet connection with the raised tabs on the coupling member.

6. Regular and auxiliary hour hand driving and setting mechanism for a horological 70 device substantially as hereinbefore described with reference to Figures 1 and 3 to 7 of the accompanying drawings.

7. A watch including regular and auxiliary 75 hour hand driving and setting mechanism according to any one of the preceding claims.

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